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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 10/807,248 | 03/24/2004 | Tomoe Yamamoto | 8070-1006 | 4518 |

466 7590 08/04/2005

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| EXAMINER | |
|---|---|
| PHAM, LONG | |

| ART UNIT | PAPER NUMBER |
|---|---|
| 2814 | |

DATE MAILED: 08/04/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/807,248 | YAMAMOTO ET AL. | |
| | Examiner | Art Unit | |
| | Long Pham | 2814 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) 1-10 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-10 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date 03/24/04.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

## DETAILED ACTION

### *Election/Restrictions*

1. Applicant's election without traverse of claims 1-10 in the reply filed on 06/14/04 is acknowledged.

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ufer et al. (US patent 6,627,034).

With respect to claims 1 and 2, Ufer et al. teach a semiconductor device comprising a semiconductor substrate 10,20 and a metal compound film 30 thereon, wherein the metal compound film has a composition represented by the formula (see figs. 1-7 and associated text):

M-O-C-H-N, wherein M comprises of at least Hf or Zr.

Ufer et al. fail to teach the relative weight percent or the values for x, y, and z of O, C, and N.

However, it would have been obvious to one of ordinary skill in the art of making semiconductor devices to determine the workable or optimal values or ranges for relative weight percent or the values of x,y, and z of O, C, and N through routine experimentation and optimization to obtain optimal or desired device performance because these are result-effective variables and there is no

evidence indicating that they are critical or produce any unexpected results and it has been held that it is not inventive to discover the optimum or workable ranges of a result-effective variable within given prior art conditions by routine experimentation. See MPEP 2144.05.

With respect to claims 3 and 4, how the metal-compound is made has not been given patentability weight since the claims are directed to device or structure.

***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 5-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over the applicant's admitted prior art (AAPA) in combination with Ufer et al. (US patent 6,627,034).

With respect to claims 5 and 10, AAPA teaches a semiconductor device comprising a substrate 21, a pair of electrodes 23 thereon a capacitor comprising a dielectric film 35 between the electrodes (see fig. 2 and associated text of the specification of this application).

However, AAPA fails to teach that the dielectric film comprises of a metal compound composition represented by the formula:

$MO_xC_yN_z$, wherein M comprises of at least Hf or Zr.

Ufer et al. teach a dielectric film made of a metal compound film 30, wherein the metal compound film has a composition represented by the formula:

M-O-C-H-N, wherein M comprises of at least Hf or Zr. See figs. 1-7 and associated text.

It would have been obvious to one of ordinary skill in the art of making semiconductor devices to use the dielectric film of Ufer et al. in the device of AAPA because the dielectric film made of the metal compound can be separated from the substrate to allow the removal of the dielectric film in unselected portions of the substrate. See col. 2, lines 20-25.

Ufer et al. fail to teach the relative weight percent or the values for x, y, and z of O, C, and N.

However, it would have been obvious to one of ordinary skill in the art of making semiconductor devices to determine the workable or optimal values or ranges for relative weight percent or the values of x, y, and z of O, C, and N through routine experimentation and optimization to obtain optimal or desired device performance because these are result-effective variables and there is no evidence indicating that they are critical or produce any unexpected results and it has been held that it is not inventive to discover the optimum or workable ranges of a result-effective variable within given prior art conditions by routine experimentation. See MPEP 2144.05.

With respect to claims 6 or 7, AAPA fails to teach that the gate electrodes are made of Ti, Ta, TiN, or W.

However, the use of Ti, Ta, TiN, or W as electrode material is well-known.

With respect to claim 8, AAPA fails to teach the range for the thickness of electrode.

However, it would have been obvious to one of ordinary skill in the art of making semiconductor devices to determine the workable or optimal values or

ranges for the thickness of the gate electrodes through routine experimentation and optimization to obtain optimal or desired device performance because it is a result-effective variable and there is no evidence indicating that it is critical or produces any unexpected results and it has been held that it is not inventive to discover the optimum or workable ranges of a result-effective variable within given prior art conditions by routine experimentation. See MPEP 2144.05.

With respect to claim 9, AAPA further teaches a source region and a drain region 24, a connecting plug 31 for connecting the source and drain regions in the transistor with capacitor. See fig. 2 and associated text of the specification of this application.

With respect to claim 10, AAPA further teaches a gate insulating film formed on the main surface of the semiconductor substrate, a gate electrode 23 on the gate insulating film, and a source region and a drain region 24 formed on the semiconductor substrate which together sandwich the gate electrode. See fig. 2 and associated text of the specification of this application.

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Long Pham whose telephone number is 571-272-1714. The examiner can normally be reached on M-F, 7:30AM-3:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on 571-272-1705. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Long Pham
Primary Examiner
Art Unit 2814

LP